Abstract of the Disclosure

An apparatus and corresponding method for determining component flow rates of a multiphase fluid in a conduit, the fluid consisting of at least three known components, the method including the steps of: measuring at each of two different positions along the conduit at least four mixture quantities, typically the sound speed, the flow velocity of the multiphase fluid, the pressure and the temperature; providing a speed of sound in each of the components at the measured pressures and temperatures; providing a trial value for each of either the component flow rates or the phase fractions; using a predetermined model to calculate values for the measured mixture quantities based on the trial values for each of either the component flow rates or the phase fractions; using a predetermined error function to determine an error value; and using a predetermined optimizing algorithm to determine whether the calculated values are acceptable, and, if they are not, to provide a new trial value for each of either the component flow rates or the phase fractions. In some applications, the error function is the sum of the squares of the difference between the measured and calculated values at each point.